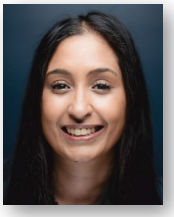
AAI Education Committee Highlight: Teaching Tools

The Immunology Teaching Interest Group (ITIG) was created by the AAI Education Committee as an informal group composed of past speakers and attendees of the ITIG sessions, including current immunology educators spanning a range of institutions and levels. It serves as a resource for novel teaching tools and practices that can be implemented in courses to enhance immunology education. Because of the great interest in this topic, the AAI Newsletter *features "Teaching Tools" articles highlighting ITIG presentations.*

Cross-disciplinary and cross-institutional student collaboration for undergraduate immunologists



Jasty Singh, Ph.D. (AAI '19)
Associate Professor, Teaching Stream & Associate Chair, Undergraduate Studies, Department of Immunology, *Univ. of Toronto*

Gabrielle Lam Ph.D., P.Eng.
Assistant Professor of Teaching, Department of Materials Engineering & School of Biomedical Engineering; Director, Undergraduate, School of Biomedical Engineering, *Univ. of British Columbia*

Immunology is a cross-disciplinary field, existing at the interface of biology, engineering and medicine. A crucial skill for immunologists to develop is their ability to collaborate with others with different expertise, such as biomedical engineers and statisticians. Undergraduate students at most institutions have few formal opportunities to engage in these collaborations. Most team-based projects allow students to work with fellow immunology or biology peers; however, the opportunity to do so with students in other fields is rare[1]. Even fewer opportunities exist to collaborate with students from other academic institutions.

Recognizing this gap, we developed a cross-disciplinary, cross-institutional collaborative group project between two undergraduate courses, IMM360 (Scientific Methods and Research in Immunology, University of Toronto) and BMEG372 (Biomedical Materials and Drug Delivery, University of British Columbia). Virtual project teams (5–6 students) were created with relatively equal representation of students from both courses. Students completed a multi-phased collaborative immunoengineering-based group project from September–December in 2022 and 2023. Here is a subset of activities as part of the group project:

Activity 1 | Meeting the Team. The first activity was launched at the outset of the collaboration. To empower students to build relationships, student groups worked together to create a team contract and group resumé that captured what they wanted to get out of the project, their current knowledge in their respective discipline(s), previous work experiences (course-relevant or otherwise), and any notable accomplishments/hobbies they were proud of.

The assignment goal was to have students appreciate the wealth of diversity that existed as part of their team, to set them up for collaborating effectively.

Activity 2 | The Assignment. Students were assigned a published research paper in the field of immunoengineering. For their assignment, students needed to:

1. understand the research paper and provide a critique. This required a thorough understanding of the research question, drug delivery system, methods used, study design, and statistical approaches. Students were also provided the raw data associated with the publication, providing them an opportunity to reanalyze the authors' data. Through this process, students uncovered issues with data/methods reporting and reproducibility.
2. propose follow-up studies as an extension of the authors' work, with proposed studies reflecting elements of both drug delivery design and immunology. Each proposed study required a strong rationale, including justification of the group's choice of drug delivery system, methodology, sampling strategy and analysis/statistical methods. This component of the team's effort was the most collaborative in nature, bringing together both engineering and immunology expertise.

Activity 3 | Evaluating Team Success. At various points throughout the term, students were asked to evaluate their peers and themselves through an online teamwork and behavioral assessment platform, ITP Metrics[2]. These evaluations offered students the opportunity to reflect on their contributions, and to respect the opinions of their peers for enhancement of overall team health.

Based on anecdotal observations and student feedback from course evaluations, students appreciated the cross-disciplinary nature of the collaborative group project and the opportunity to engage with their peers professionally. We hope that learnings from this work will inform an effort to weave cross-disciplinary collaboration into undergraduate/graduate education at other institutions.

References

1 Aagaard-Hansen, J., 2007. The challenges of cross-disciplinary research. *Social epistemology*, 21(4), pp.425–438.
2 *www.itpmetrics.com*